National Institute of Environmental Health Sciences

Challenges in predicting climate and environmental effects on vector-borne disease episystems in a changing world

Author(s): Tabachnick WJ
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Abstract:

Vector-borne pathogens cause enormous suffering to humans and animals. Many are expanding their range into new areas. Dengue, West Nile and Chikungunya have recently caused substantial human epidemics. Arthropod-borne animal diseases like Bluetongue, Rift Valley fever and African horse sickness pose substantial threats to livestock economies around the world. Climate change can impact the vector-borne disease epidemiology. Changes in climate will influence arthropod vectors, their life cycles and life histories, resulting in changes in both vector and pathogen distribution and changes in the ability of arthropods to transmit pathogens. Climate can affect the way pathogens interact with both the arthropod vector and the human or animal host. Predicting and mitigating the effects of future changes in the environment like climate change on the complex arthropod-pathogen-host epidemiological cycle requires understanding of a variety of complex mechanisms from the molecular to the population level. Although there has been substantial progress on many fronts the challenges to effectively understand and mitigate the impact of potential changes in the environment on vector-borne pathogens are formidable and at an early stage of development. The challenges will be explored using several arthropod-borne pathogen systems as illustration, and potential avenues to meet the challenges will be presented.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Security, Unspecified Exposure

Food/Water Security: Livestock Productivity

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: West Nile Virus

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content